Framing the future: Using local narratives of change to explore future visions and knowledge needs for urban climate resilience

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Background

Cities face increasing pressures from climate change, along with other challenges, and many aim to increase urban resilience to these. This inherently involves intersecting science & knowledge and societal preferences. Cities seek locally embedded knowledge that can help them achieve their goals. The climate knowledge community, who might provide such embedded knowledge, has developed the notion of 'climate services'. These "provide climate information in a way that assists decision making by individuals and organizations. Such services require appropriate engagement along with an effective access mechanism and must respond to user needs." (WMO, 2018). Particularly, such services involve various forms of climate and meteorological data, such as on temperature, rainfall, wind, soil moisture, etc. They can also include translations and broader risk and vulnerability assessments that might support climate-related policies, as well as non-climate data that may help such assessments. However, much of this process still reasons *from science*: what data is available and how could this best be put to societal use? While valuable, this approach risks not truly meeting the needs of the cities for climate services: what's available is not necessarily the same as what's needed locally to adapt. Rather, or at least parallel, the questions should be posted in the opposite manner: what processes take place regarding weather, water, climate, and adaptation locally and what consequences would that have for the needs that cities may have for climate services?

CoCliServ narrative-based iterative scenarios

In the CoCliServ project (CoCliServ, 2018), we're working with local communities (cities and regions) in a bottom-up, transdisciplinary scenario/futures process. Rather than exploring the usefulness of existing climate knowledge, we're basing our approach in local 'narratives of change': how do people in a city or region experience weather and water in past, present and future (Krauβ et al, 2018a,b). These are then translated with the local community, into future visions (Wardekker et al., 2018): what consequences do the narratives have for framing the challenge of climate resilience? How might the climate adaptive city or region look like, and what would life be like, ideally in the future? These visions form the basis of a scenario design study.

Policy scenarios plot potential courses (plans of action) on how to achieve the future visions, for example using backcasting methods (e.g. Vervoort et al., 2014; Dammers et al., 2013a,b). Classic policy scenarios present a set of separate, uniform storylines that reach a specific future (Figure 1). This is suitable for strategic decision-making with long term goals, but not ideal for exploring the range of potential knowledge needs over time, including shorter time scales. These shorter time scales are important, because of current and near term climate change impacts, and because local urban decisions made in the short run could impact influence climate vulnerability for many decades to come. They match well with the way in which high-level policymakers and scientists think about adaptation, but much less with how on-the-ground practitioners and citizens do think about them. Instead, CoCliServ will use a novel approach that is inspired by these methods but tailors them to thinking about knowledge needs: incremental scenarios (Vanderlinden, 2015; Wardekker et al., 2018). They describe a sequence of possibilities, where one scenario might branch off from another. The points where an event happens

that turns the development in a city or region towards another future, are called 'hinge points' or 'branching points' (see also Haasnoot et al., 2013). These points, in turn, provide insight into information needs: what does a city need to know (and when!) to navigate these branches successfully – to make sure that they move towards and stay in those developmental paths that lead them to a desired rather than an undesired future.

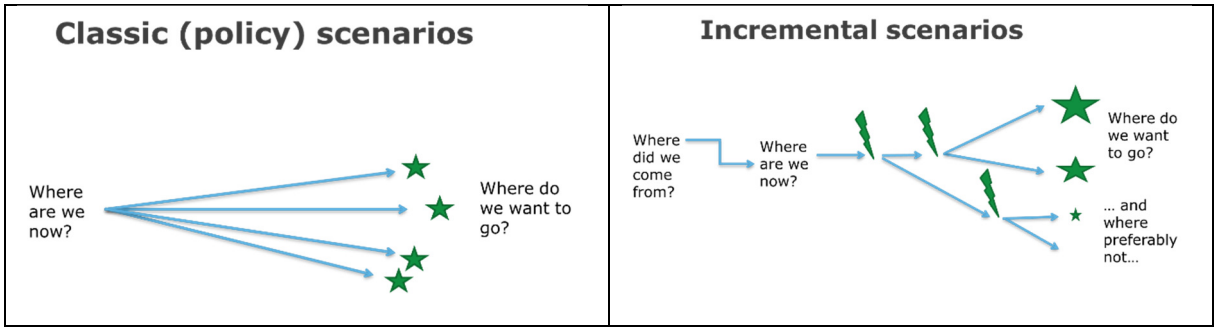

Figure 1. Classic policy scenarios (left) compared to CoCliServ's incremental scenarios (right), with hinge points that lead to branches in the scenario (source: Wardekker et al., 2018).

Narratives of change in Dordrecht

CoCliServ is currently one year underway. The work on narratives of change is being wrapped up and the transition to scenario design is in progress. In the Dordrecht case study, we're exploring how the local narratives of change can give direction to the design of future visons.

Dordrecht is a city of ca. 120.000 inhabitants in the west of the Netherlands, just east of Rotterdam and close to the sea. It is surrounded by rivers and the sea on all sides; as locals describe it: "water comes from all directions" (north, east, south, west, above, below). Consequently, the city is highly sensitive to issues around weather, water, and climate. It also struggles with socioeconomic issues, and faces a housing development goal of 10.000-15.000 houses within current city limits. Within the Dordrecht case, we're particularly interested in the Reeland/Vogelbuurt neighbourhood, large parts of which involve social housing projects that are scheduled for urban renewal. In several parts of the area, the sewer systems will also be overhauled, as will the sport facilities at the edge of the neighbourhood. Furthermore, we focused on organisational (particularly authorities) and individual (particularly citizen) narratives.

In the narrative research on Dordrecht (Marschütz, 2018), a first key result was that there are several strongly overlapping narratives between authorities and citizens. Both groups are well aware of the history of the city, shaped geographically and economically by water, and by a series of historical floods. These include particularly the St Elisabeth's Flood of 1421 and the North Sea Flood of 1953. This historical embeddedness resulted in a shared identity surrounding the 'Island of Dordrecht', and its inhabitants as islanders. This identity is further embedded in cultural memory (e.g. flood stones and plaques with photos of historic flooding throughout the city), and institutions (e.g. various water management authorities).

Other narratives are diverging. While there is a shared notion of climate change as a major relevant issue for the city, the specific narration and framing of the problem and appropriate solutions diverges. Authorities base their narrative on a notion of vulnerability to climate-related risks, and preparation for climate and water-related extremes through strategic long-term adaptation efforts, particularly through spatial planning and infrastructural interventions. Citizens on the other hand, narrate on weather, water and climate in a more experiential and holistic way. They observe that water levels are increasing and expect this to worsen in the future due to climate change. They argue that 'something needs to be done', and propose and enact practical, small scale actions for dealing with water, as well as argue that climate mitigation efforts should be explicitly included to "tackle the root of these problems".

Other narratives partly overlap, with specific diverging framings. Both groups share a strong desire for collaborative development of solutions that move beyond classic approaches (which they feel may soon no

longer be viable) and increase climate resilience instead. The authorities, particularly the Municipality, are already focusing on citizen involvement, but citizens do not see this and do not feel heard. Another such narrative deals with socio-economic constraints in the city. Both groups of interviewees are aware that Dordrecht is not in very good shape. The authority narratives focus on the old buildings and the limits of and risks for city budget. Citizens discuss their experiences with unemployment, and social problems.

Uncertainty and knowledge quality

Some of the uncertainties that local actors have, can be deduced from the narratives. These include the range of local climate change impacts, but also the viability and effectiveness of options to cope with water, weather, and climate change in the area. Examples are: will the current dike systems remain viable? And how can we effectively cope with extreme events? Uncertainties related to the socio-economic situation are also discussed, such as changes in demography (e.g. rich versus poorer groups of inhabitants), and the city budget. These uncertainties offer insights into potential hinge points, but they will likely also impact the way in which local actors formulate their future visions.

Several 'surprise scenarios', or 'wildcards', also emerged from the narratives. These relate to a specific type of uncertainties: the 'known unknowns' (e.g. Wardekker, 2011; Wardekker et al., 2018). They present an event or set of circumstances that, while the likelihood is perceived as low (though in fact unknown), could have a high potential impact on the city. Examples from the narratives include:

- High river discharge from the east coincides with a North Sea storm, and possibly a spring tide, and result in a major flood event. The situation can be partly impacted (positively or negatively) by the responses of German water safety agencies (east), as well as those in Rotterdam (west).
- An economic crisis hits key local economic sectors, particularly the ship building and shipping industries, resulting in major financial and job losses for Dordrecht, and potentially long-term economic disruption.
- The population is fed up with growing flood risks or recurring minor flooding, resulting in a negative stigma for the city and the population potentially leaving. Particularly of concern are the higher socio-economic segments – if the richer population leaves, this would heavily impact the city budget, and consequently the resources that the city has available to counteract impacts and adapt climate change.

Surprise scenarios contribute to the inventory of hinge points in the CoCliServ process.

Finally, the elicited narratives seem to offer some clues into the assumptions that authorities and citizens have regarding future developments. This includes climate change and its potential impacts, but also response strategies, other actors' actions, effectiveness of such actions, interactions with other problems and values, and processes that happen at higher and lower geographical scales and political/policy levels. These assumptions have a bearing on the validity of the scenarios and the quality of the knowledge and climate services developed. This may be included in the work that CoCliServ will do on Knowledge Quality Assessment. Methods are already available for inventory and critical reflection on assumptions (Kloprogge et al, 2011; De Jong et al., 2012; Van der Sluijs & Wardekker, 2015) and these could be adapted for this purpose. However, the incremental scenario method that CoCliServ develops is itself based on earlier notions of 'assumption-based planning' (Dewar et al., 1993). Consequently, assumptions could also play a role in the scenario design, or later reflection on that. Particularly, they impact the scenarios and hinge points.

Moving to visions and scenarios: framing the future

The narratives offer insights into a variety of things, such as the types of climate change impacts that citizens and authorities expect and/or are afraid of, the mental models of how such impacts arise (cf. Wardekker, 2004), the types of options they envision, as well as what elements are particularly stressed (Marschütz, 2018). In doing so,

they frame the future as conveyed through narratives: what is the problem, who's problem is it, what causes it, what morals apply, and what solutions are appropriate. Such framing steers both the adaptation strategies that are taken (Wardekker, 2011, in press) and the knowledge and tools that are seen as appropriate and useful given the situation (Wardekker et al., 2009). Water-related issues dominate currently the elicited narratives, including extreme precipitation events, storms, large river discharge, and similar relatively short events. They also include longer trends such as rising water levels on sea and rivers, and the interplay and coincidence between these, for example similar to the historical floods (North Sea storm plus heavy river discharge). The elicited narratives also reflect other, non-climate related concerns and desires, and include both issues that are seen as 'controllable locally' and those seen as outside of local control. The perceived problems, causes, moral values, and preferred solutions frame both desired and undesired futures that local actors have, as well as early indications of what types of actions might be included in the scenarios.

We observed that the narratives of authorities and citizens present distinct visions (more e.g. in Marschütz, 2018; Krauß et. al 2018b). Authorities see the future in terms of 'vulnerability & adaptation': specific, narrow problems countered with a long-term strategic approach. Citizens view this in terms of 'experiences and action': a broad experiential view of the challenges (including mitigation and social issues), countered with practice-based small actions. In situations where framing diverges strongly, one would need to work with divergent future visions (Wardekker et al., 2018), in order to compare choices and trade-offs. However, there is also a high degree of overlap in the historical embedding, identity, and basic view of climate change as a problem for the city, and the desire for collaboration in designing a resilient future. This allows us to work with a single, overarching scenario, tied to a vision of a 'resilient island' (Figure 2). Both authority and citizen narratives have value within this vision. We will combine elements from both narratives in sub-visions that highlight specific aspects of the overarching vision, preferably using an engaging concept or metaphor. In doing so, we can help the local community paint an image of what life on the 'Isle of Dordrecht' might look like in the future, as framed by the hopes and desires expressed in their narratives.

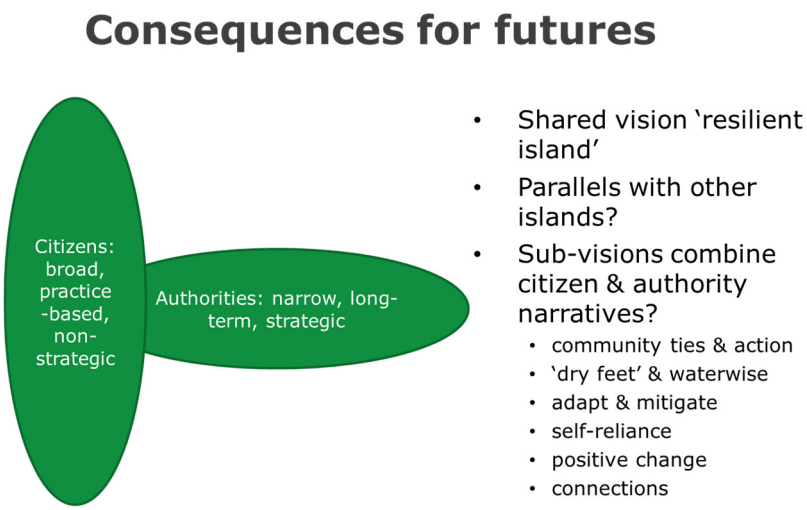

Figure 2. Scenario approach in Dordrecht: Single overarching vision, combining authority and citizen narratives.

References

Dammers, E., S. van ‘t Klooster, B. de Wit, H. Hilderink, A. Petersen, W. Tuinstra (2013a). "Scenario’s maken voor milieu, natuur en ruimte: Een handreiking". [Developing scenarios for environment, nature, and space: A guidance] PBL Netherlands Environmental Assessment Agency, Bilthoven.

Dammers, E., S. van ‘t Klooster, B. de Wit, H. Hilderink, A. Petersen, W. Tuinstra (2013b). "Scenario’s maken voor milieu, natuur en ruimte: Een checklist". [Developing scenarios for environment, nature, and space: A checklist] PBL Netherlands Environmental Assessment Agency, Bilthoven.

De Jong, A., J.A. Wardekker, J.P. van der Sluijs (2012). "Assumptions in quantitative analyses of health risks of overhead power lines". *Environmental Science & Policy*, 16, 114-121.

Dewar, J., C. Builder, W. Hix, M. Levin (1993). “Assumption-Based Planning: A Planning Tool for Very Uncertain Times”. RAND Corporation, Santa Monica.

CoCliServ (2018). CoCliServ project website, Accessed 14 November 2018. http://cocliserv.cearc.fr/

Haasnoot, M., J.H. Kwakkel, W.E. Walker, J. ter Maat (2013). "Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world". *Global Environmental Change*, 23 (2), 485-498.

Kloprogge P., J.P. van der Sluijs, A.C. Petersen (2011). "A method for the analysis of assumptions in model-based environmental assessments". *Environmental Modelling & Software*, 26, 289–301.

Krauβ, W., S. Bremer, A. Wardekker, B. Marschütz, J. Batzan, C. da Cunha (2018a). “Initial mapping of narratives of change”. ERA4CS CoCliServ report D1.1. CoCliServ, Guyancourt.

Krauβ, W., S. Bremer, A. Wardekker, B. Marschütz, J. Batzan, C. da Cunha (2018b). “Chronology and in-depth analysis of weather-related and place-specific narratives of climate change”. ERA4CS CoCliServ report D1.2. CoCliServ, Guyancourt.

Marschütz, B. (2018). Narratives for a future-proof city: The case of Dordrecht, The Netherlands. Utrecht University, Utrecht.

Van der Sluijs, J.P., J.A. Wardekker (2015). "Critical appraisal of assumptions in chains of model calculations used to project local climate impacts for adaptation decision support – the case of Baakse Beek". Environmental Research Letters, 10, 045005.

Vanderlinden, J.P. (2015). "Prévoir l'imprévu". In: Gemenne, F. (Ed.), "L'enjeu mondial. L'environnement". Presses de Sciences Po, Paris.

Vervoort, J.M., P.K. Thornton, P. Kristjanson, W. Förch, P.J. Ericksen, K. Kok,..., A. Wilkinson (2014). "Challenges to scenario-guided adaptive action on food security under climate change". Global Environmental Change, 28, 383-394.

Wardekker, A. (in press). “Framing ‘resilient cities’: System versus community focussed interpretations of urban climate resilience”. In: “Urban resilience: Methodologies, tools and evaluation”. Springer, Cham.

Wardekker, J.A. (2011). “Climate change impact assessment and adaptation under uncertainty. PhD thesis. Utrecht University, Utrecht.

Wardekker, J.A. (2004). “Risk communication on climate change”. Utrecht University, Utrecht.

Wardekker, A, J. Baztan, S. Bremer, W. Krauβ, H. Runhaar, J. van der Sluijs, J.P. Vanderlinden, J. Vervoort, D. Wildschut (2018). “Draft scenario protocol”. ERA4CS CoCliServ report M2.1. CoCliServ, Guyancourt, France.

Wardekker, J.A., J. de Boer, M.J. Kolkman, J.P. van der Sluijs, K.S. Buchanan, A. de Jong, A. van der Veen (2009). "Tool catalogue frame-based information tools".

WMO (2018). “What are weather/climate services?”. World Meteorological Organisation, Geneva. Website, accessed 14 November 2018. http://www.wmo.int/gfcs/what_are_climate_weather_services